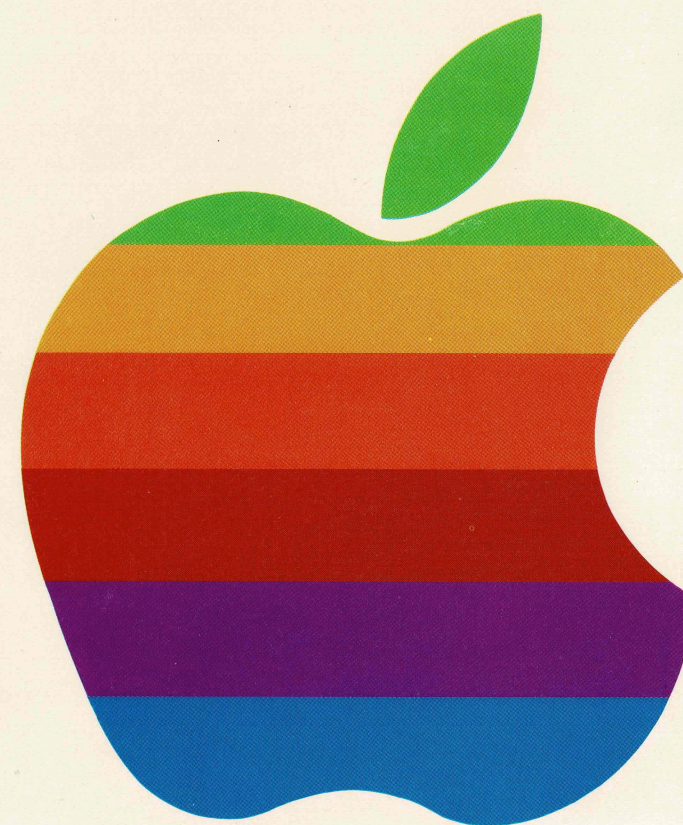


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apple II



APPLE II PERSONAL COMPUTER SYSTEM



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Southwestern Data Systems

*business systems and software
data services
micro computers for the home*

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APPLE II

PERSONAL COMPUTER SYSTEM

GETTING STARTED

APPLE II will change the way you think about computers. That's because it is specifically designed to handle the day to day tasks of education, financial planning, building security, scientific calculation, and entertainment. APPLE II is appealing and comfortable (like other appliances that make your life easier); and it brings to personal computing a new level of simplicity through hardware and software sophistication.

APPLE II is faster, smaller, and more powerful than its predecessors. And it's more fun to use too, because of advanced, built-in features like:

- BASIC — The Language that Makes Programming Fun
- Fifteen-Color Standard Graphics (in an 1,880-Point Array) for Spectacular Visual Effects
- High-Resolution Graphics (in a 54,000-Point Array) for Finely-Detailed Displays
- Loudspeaker and Sound Capability that Brings Programs to Life
- Four Hand-Control Inputs for Games and Other Human-Input Applications
- Internal Memory Capacity of 48K Bytes of RAM, 12K Bytes of ROM; for Big-System Performance in a Small Package
- Eight Accessory Expansion Slots to let APPLE II Grow With Your Needs

You don't need to be an expert to use and enjoy APPLE II. It's a complete, read-to-run computer — not a kit. Connect it to your color TV* and start writing programs the very first evening. Become familiar with BASIC, using the 125 page Programming Manual. You'll gain deep satisfaction and a feeling of accomplishment as you learn to create color games and artistic displays; or instruct APPLE II to chart your home finances. Controlling the computer is easy; using its familiar, typewriter-style keyboard and conversational BASIC language.



SAY IT IN COLOR

APPLE's advanced graphics commands make brilliant, effective, color displays something even a beginner can master. And the usefulness of color extends far beyond entertainment. Multi-color charts and graphs can "humanize" your programs for greater interest and comprehension.

High-resolution graphics can take you even farther. APPLE's 54,000-point color display lets you explore applications ranging from architectural design to fingerprint analysis. And you can label your diagrams with upper/lower case characters, Greek letters or special symbols. You can even define your own unique character sets.

SOUND ADDS A NEW DIMENSION

APPLE II speaks for itself. In STAR WARS, you'll actually hear the phasers fire through a built-in speaker. And you can create your own music under computer control. But synthesized sound is more than a toy. Audible cues announce system functions or programming errors, so you don't have to watch the TV monitor to see what's happening. In your own programs, tones add life to games and presentations.

HAND CONTROLS INCLUDED

Up to four rotary hand controls and three pushbuttons connect directly to APPLE II (two of each come with the computer), and are used with simple BASIC commands. They assist in applications ranging from "ball and paddle" games to graphic design, where the operator interacts with figures on the screen.

USER PROGRAM- MABLE

A fast, powerful integer BASIC is built into APPLE II. It lets you write complex programs, and generate spectacular color graphics displays. For business and scientific programming, Applesoft Floating-Point BASIC provides an extensive library of mathematical and character-handling functions, as well as 9-digit precision in arithmetic calculations.

The built-in assembler, disassembler and monitor will be appreciated by advanced programmers in search of more speed or flexibility than BASIC can provide.

A LEARNING TOOL

APPLE II is a portable education. Using it, you'll begin to learn what a computer is all about. You'll discover how easy it is to create programs that help your kids with arithmetic or spelling. (Yes, it's OK to let your kids use APPLE II. It's ruggedly engineered and has a virtually unbreakable molded case.) You can save those programs on an ordinary cassette recorder, or on the optional floppy disk subsystem. As your skill grows, your library will too. And you will enjoy expanding that library in future years through your local Apple users group or from the rapidly growing Apple Software Bank.

APPLE GROWS WITH YOU

APPLE II was designed to grow with you, so we built in expandability at the start — with a hefty power supply and eight interface card slots right on the system circuit board. You can synthesize music, print mailing labels, control AC receptacles, or talk to another computer; all just by plugging in a card. And the best is yet to come, as new Apple hardware and software options appear on a monthly basis this year.

AND YET...

APPLE II is simple on the outside. Like a TV set or an automobile, it is sophisticated enough to be easy to use. But as you gain experience with it, you'll grow to appreciate the sophistication inside. It shows up in features like the built-in assembler, disassembler, utility routines, and monitor; a switching power supply that runs cool without fans; and a circuit design so trouble-free that we warrant it for one full year.

Introduce yourself to APPLE II — the advanced personal computer that's a tool for today, and a continuing challenge for years to come.

Simplicity. Sophistication. APPLE II



APPLE II

TECHNICAL OVERVIEW

APPLE II is a complete, self-contained, ready-to-use computer based on the 6502 microprocessor. Standard features include BASIC, assembler, disassembler, and monitor in ROM; color graphics, sockets for up to 48K bytes RAM, cassette interface, Apple game I/O connector, typewriter-style ASCII keyboard, high-efficiency switching power supply and rugged structural foam case. Also included as standard are: demonstration cassette tapes, two game controls, and detailed Reference and BASIC Programming manuals.

VIDEO DISPLAY

The APPLE II video circuitry displays memory as text, color graphics, or high-resolution graphics — software selectable. Both graphics modes can be selected to include 4 lines of text at the bottom of the display area. In either graphics mode the user can select (under software control) one of two memory pages to be displayed. The standard Apple provides an NTSC composite video output.

TEXT

- 40 characters/line, 24 lines
- 5 x 7 upper-case characters
- Normal, inverse or flashing characters
- Extensive display control software in ROM
- Full cursor control
- Fast display — 1000 cps

COLOR GRAPHICS

- 40h x 48v resolution (40h x 40v with 4 lines text)
- 15 colors — color generated digitally
- BASIC commands to use graphics easily

HIGH RESOLUTION GRAPHICS

- 280h x 192v resolution (or 280v x 160v with 4 lines text) 4 colors — black, white, violet, green
- Displays 8K bytes (16K RAM system recommended)

MEMORY

RAM is organized into 3 increments. Each increment can be either 4K bytes (using 4K chips) or 16K bytes (using advanced 16K chips). Memory may be easily expanded by inserting an additional increment of chips. Up to 48K bytes of RAM can be contained on the single board. 8K bytes of ROM (supplied) store Apple BASIC (6K) and a powerful system monitor (2K). Two additional ROM sockets are provided for future Apple software.

- Up to 48K bytes on-board RAM — no peripheral memory boards
- Unique automatic RAM refresh system, completely transparent
- Uses 4096 or 2104 type 4K, and 4116 or 2117 type 16K RAMs
- Fast memory — 350ns access time



I/O

APPLE II includes as standard an ASCII keyboard, audio cassette interface, 8 peripheral board connectors, speaker, game I/O connector and two game controls.

- Reliable, typewriter-style keyboard
- Fast cassette interface — 1500 bps
- Peripheral board connectors
 - Fully buffered, with interrupt and DMA priority structure
- GAME I/O — 4 paddle inputs, 3 TTL inputs and 4 TTL outputs

BASIC

Apple BASIC is a fast, translated integer BASIC that includes the following features (in addition to normal BASIC capabilities).

- Any-length variable names (ALPHA, BETA\$)
- Syntax and range errors indicated immediately when entered
- Multiple statements on one line
- Integers from -32767 to +32767
- String arrays to 255 characters. Single-dimension integer arrays
- Graphics Commands: COLOR = expr; PLOT X,Y; HLINE X₁, X₂ at Y; (draw horizontal line), VLINE Y₁, Y₂ at X; SCRN(x,y) (reads the screen color)
- Paddle read function: PDL(0-3)
- TEXT and Graphics Commands to set display mode from BASIC
- Immediate execution of most statements
- Memory boundary adjust (does not destroy current program)
- Break and Continue program execution
- Debug commands: line number trace and variable trace
- Switchable I/O device assignments
- Direct memory access: PEEK, POKE, CALL commands
- Cassette SAVE and LOAD commands
- Auto line number mode
- RND, SGN, ASC, LEN and ABS functions
- POP instruction pops the return stack one level
- GOTO expr, GOSUB expr allowed
- Fully interruptable

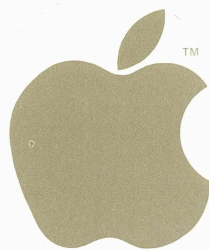
MONITOR

- 2K byte ROM monitor
- Screen control (intelligent display routines). Full cursor control
- Scrolling window adjustable (protected screen feature)
- Software simulated single-step and trace modes
- Disassembler and single-pass assembler
- Input/Output device assignment
- Editing on keyboard entry
- Floating-point package
- Breakpoint handling
- Register examine/modify
- Read/Write cassette routines
- Inverse/Normal/Flashing video selection
- Hex add/subtract for relative branch calculations

ORDERING INFORMATION

All non-European APPLE II systems are identical except for the amount of RAM supplied. Systems with 16K or more RAM include Applesoft BASIC on tape, with documentation. PAL and SECAM-compatible versions of APPLE II are available through Eurapple.

Order No.	RAM	Order No.	RAM
A2S0004	4K bytes	A2S0032	32K bytes
A2S0016	16K bytes	A2S0048	48K bytes



APPLE INTELLIGENT INTERFACES

PARALLEL PRINTER INTERFACE CARD

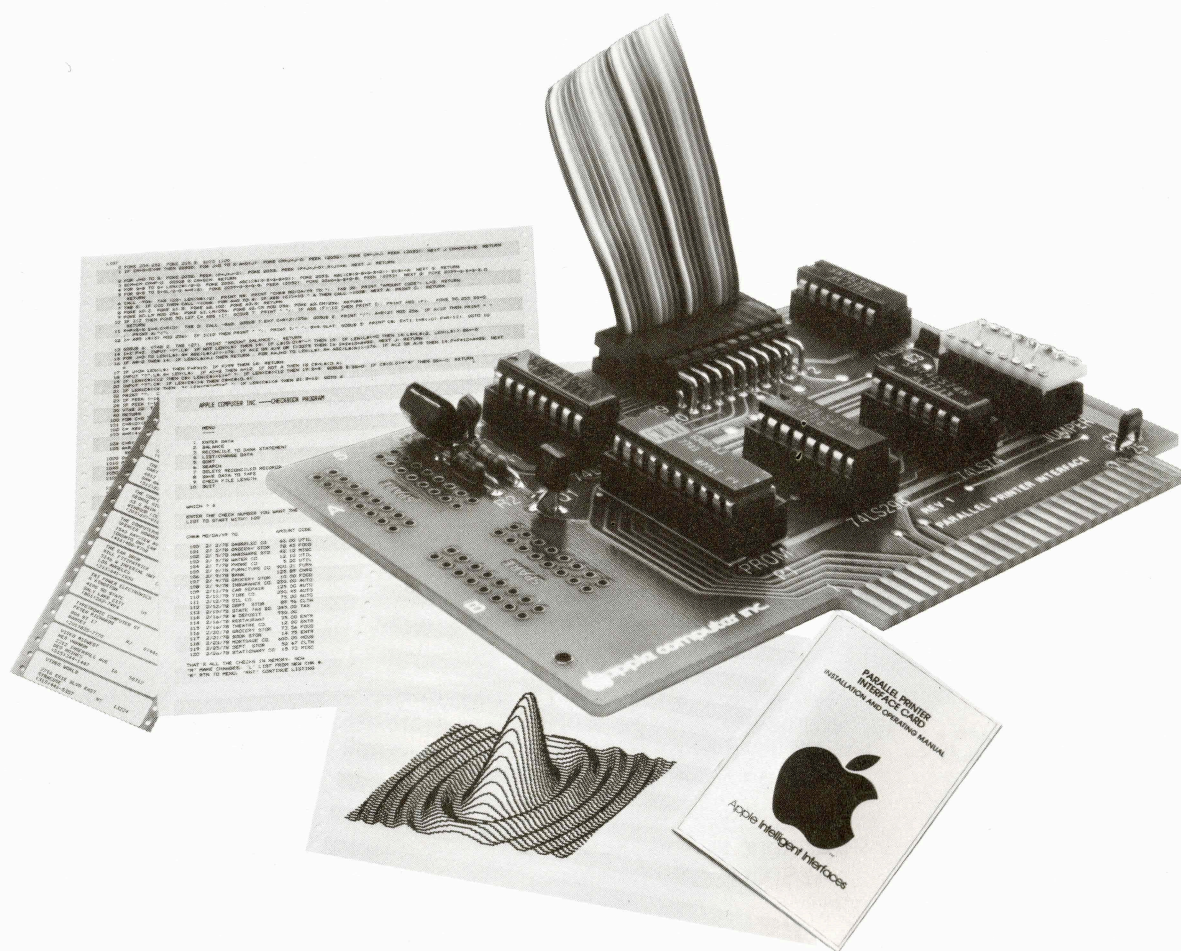
GENERAL DESCRIPTION

The Parallel Printer Interface Card opens up a whole range of printing applications for your APPLE II. With this card (and almost any popular printer), you can produce the reports, diagrams, labels and listings your application requires. And, because this interface is intelligent, it's easy to use — no complex control programs for you to write or load. The card's built-in brainpower does the work for you; while you concentrate on the job you want to do.

We designed this card to handle the whole task of printer control; so that your programs can use all the capabilities built into your printer. Expanded headlines, lower-case text, graphics — if the printer can do it, you can now program it simply and quickly, in BASIC. By building in the firmware that makes this card intelligent, we set a new performance standard for personal computer interfaces.

FEATURES

- No Programming Needed — All Required Software in On-Board ROM
- Allows Printing Through Simple BASIC Commands
- Allows Up to 255 Char/Line — Upper and Lower Case, Special Symbols, etc.
- Handles Printers Up to 5000 Char/Sec (3700 LPM @ 80 Char/Line)
- Fully Assembled — Not a Kit
- Interfaces to Most Popular Printers (Axiom, Centronics, SWTP, etc.) Through an 8-bit Parallel Port
- Easy Installation — Simply Plugs into a Connector in the APPLE II



USING THE PARALLEL PRINTER INTERFACE CARD

The intelligent Printer Interface Card allows your BASIC program to produce hard-copy output as easily as it "prints" on the TV monitor screen. Command interpretation and printer control details are handled by the firmware built into the card, to eliminate user programming requirements.

A simple BASIC command, such as PR#1, initializes the Printer Card. Subsequent PRINT statements will send data to the printer as well as the TV monitor at 40 characters/line. (The card does not normally have to be initialized again unless the APPLE II is turned OFF or RESET.)

A second command disables the TV monitor and sets the printer line width between 0 and 255 characters/line. Another command returns output to both the TV and printer, at 40 characters/line.

For special applications, there are commands to change the printer control character, and to disable the automatic printer card line feed (to allow use with printers that generate their own line feeds).

And finally, the command PR#0 turns the printer card OFF entirely.

INTERFACING A PRINTER TO YOUR APPLE II

The Parallel Printer Interface Card has been tested with Axiom, Centronics, Printronix, and SWTP printers. However, it is designed to work with almost any printer that can:

- Take in data through a 7- or 8-bit parallel port;
- Accept data when a STROBE signal (supplied by the APPLE II) tells the printer that the data is ready; and
- Return an ACKNOWLEDGE signal to the Printer Interface Card when it has taken the data in for printing.

Complete information on adapting the Printer Interface Card to various printers is supplied in the Parallel Printer Interface Card Manual.

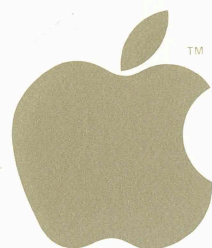
SPECIFICATIONS

PARAMETER	DESCRIPTION
Data and Control	
Outputs:	Bits 0-7 and STROBE (Positive-going or negative-going acceptable)
HIGH-LEVEL OUTPUT:	2.7V (min.) 0.4mA (max.)
LOW-LEVEL OUTPUT:	0.5V (max.), 8.0mA (max.)
Control Input:	ACKNOWLEDGE (Positive-going or negative-going acceptable)
HIGH-LEVEL INPUT:	2.0V (min.), 20μA (max.)
LOW-LEVEL INPUT:	0.8V (max.), -0.4mA (max.)
Power Consumption:	5.0V at 150mA (max.)
Firmware Storage:	6309 (256x8) PROM, on card
Printer Control Characteristics	
LINE WIDTH:	Up to 255 characters/line
OUTPUT SPEED:	Up to 5000 characters/second, controlled by the printer
Card Size:	4.5" x 2.75" (not including connector fingers); fits inside the APPLE II
Printer Connection:	By means of 20-wire ribbon cable, included (user must supply connector on printer side of cable.)

ORDERING INFORMATION

Order Number: A2B0002. Supplied with:

- Parallel Printer Interface Card
- Firmware in ROM
- Configuration Jumper Block
- Ribbon Cable
- Manual



APPLE INTELLIGENT INTERFACES

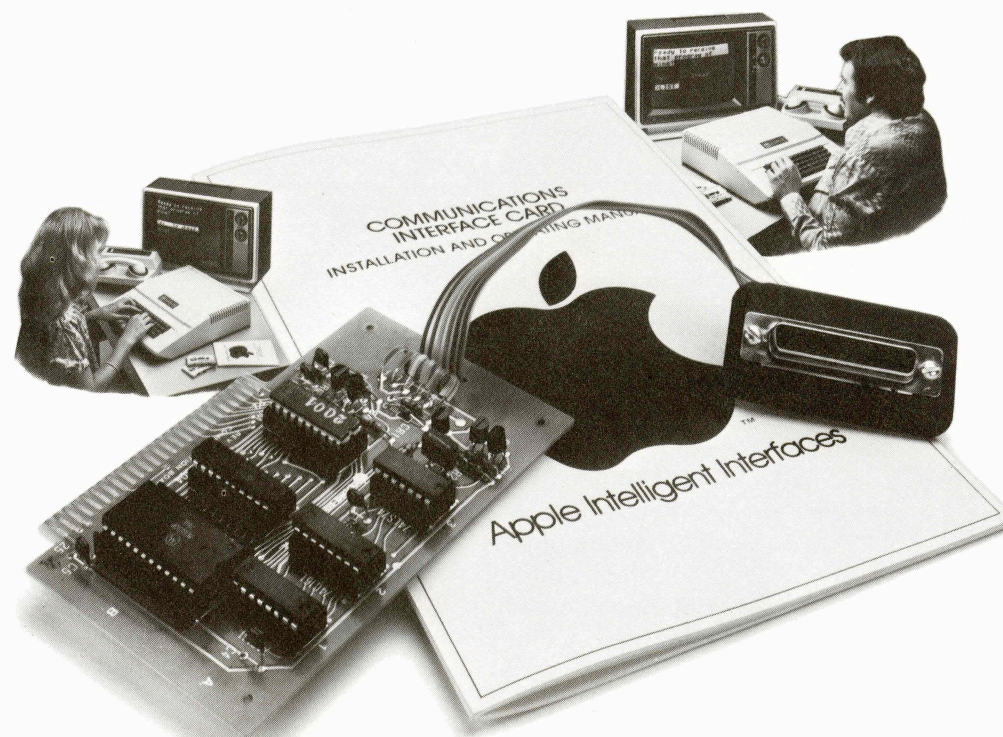
COMMUNICATIONS INTERFACE CARD

GENERAL DESCRIPTION

The Communications Interface Card extends the usefulness of your APPLE II by allowing it to "talk" (through a modem) with other computers and terminals over ordinary telephone lines. What's more, the card lets your system tap the immense resources of timesharing services and the telephone network itself. Now you can load programs over the phone lines; send messages to remote terminals through a timesharing network; or access your office computer from the comfort of your home. And best of all, because this card is intelligent, you can do all these things, quickly and easily, in BASIC. There are no control programs to write or load. Built-in firmware lets the card handle the complete job of serial communications, so you can concentrate on the job you want to do.

FEATURES

- Permits Interactive Programming and Distributed Computing using Two or More APPLE II's
- Quickly Transfers Letters, Programs, or other Information over the Phone Lines Through Standard Modems or Acoustic Couplers
- Allows the APPLE II to Become a Terminal for other Computer Systems
- Includes all Necessary Programs — No Software to Write
- Easily Controlled from BASIC using Simple Commands
- Fully Assembled and Tested — No Wiring or Soldering
- Communicates at 110 or 300 Baud, Half- or Full-Duplex
- Provides an RS-232C Serial Interface, with Industry Standard DB-25 Connector
- Works with Bell Telephone Hardware — or Similar Equipment from other Manufacturers
- Plugs into any APPLE II Expansion Slot for Fast Installation
- Uses the APPLE II Power Supply, for Economy and Convenience



USING THE COMMUNI- CATIONS INTERFACE CARD

The Communications Interface Card allows your APPLE II to exchange data with a remote computer as easily as it talks to its own keyboard and display, using standard BASIC commands. The details of this communication are completely controlled by firmware built into the card, to eliminate the need for user programming.

A simple BASIC command (such as PR#2) initializes the Communications Card to transmit any information that appears on the screen. A second command allows the APPLE II to receive data through the card. Another command allows the system to be controlled by data coming in through the card (instead of by commands from its own keyboard). A fourth transforms your computer into a "dumb terminal", moving data in and out but not operating on it.

There are commands to change the data transfer speed from 300 baud (normal) to 110; to set full or half-duplex transmission mode; and to provide special handling of lower-case characters.

INTERFACING SERIAL DEVICES TO YOUR APPLE II

The Communications Interface Card can be used to adapt a variety of serial equipment (devices that exchange data one bit at a time) to your APPLE II. Hardware that is compatible with this interface includes modems (telephone line adapters) and other equipment that can:

- Transfer serial data at 110 or 300 baud;
- Connect to an RS-232C interface (which defines the voltage levels of the data signals)

Complete operating information, logic diagrams, and firmware listings are supplied in the Communications Interface Card Manual.

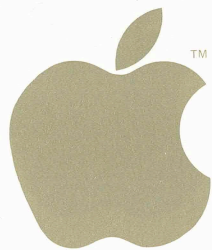
SPECIFICATIONS

PARAMETER	DESCRIPTION
Signal Level:	EIA RS-232C
Data Word Format:	1 start bit, 1 or 2 stop bits, 7 or 8 data bits; odd, even or no parity
Lower-Case Characters:	Can be optionally converted to upper-case, or can be passed through unmodified.
Power Consumption:	5V at 150mA (max.)
Firmware:	256-byte PROM, included on the card
Card Size:	4.5 by 2.75 inches (not including connector finger); fits entirely inside the APPLE II case
External Connector:	DB-25 female connector with mounting bracket

ORDERING INFORMATION

Order Number: A2B0003. Supplied with:

- Communication Interface Card
- Firmware in ROM
- Connector and Mounting Bracket
- Manual
- Demonstration Tape



APPLE INTELLIGENT INTERFACES

HIGH-SPEED SERIAL INTERFACE CARD

GENERAL DESCRIPTION

The High-Speed Serial Interface Card allows APPLE II to exchange data with computers, printers and other fast devices in serial format (one bit at a time). In the printer mode, it can produce charts, reports and labels on most popular printers. As a communications controller, it is ideal for situations in which large programs or blocks of data must be transferred. It is intended for use (in place of the Communications Interface Card) in applications that:

- Involve serial printers or terminals;
- Use data rates other than 110 or 300 baud (10 or 30 char/sec); or
- Require movement of large data blocks (256 or more bytes) without interruption

The Serial Card features on-board firmware that provides BASIC control in both block-data-transfer and printer-operation modes. A number of hardware and software switches on the card serve to adapt it to a wide variety of applications, yet it remains simple to use because of its built-in intelligence.

FEATURES

- Permits BASIC Control of High-Speed Printers and Plotters
- Quickly Transfers Large Blocks of Data by Telephone (through a modem), or Directly to Local Equipment
- Allows the APPLE II to Communicate with High-Speed Terminals and Other Computers
- Includes Control Software in ROM — No Programs to Write
- Handles Half-Duplex Communication from 75-19.2K Baud
- Provides Switch-Selectable Preset Conditions for Speed, Line Length, Auto Line Feed and Carriage Return Delay
- Fully Assembled and Tested—No Wiring Required
- Provides an RS-232C or Current Loop Serial Interface, with Industry Standard DB-25 Connector
- Works with Bell Telephone Hardware, or Similar Equipment from Other Manufacturers
- Plugs into Any APPLE II Expansion Slot for Fast Installation
- Uses the APPLE II Power Supply for Economy and Convenience



USING THE HIGH SPEED SERIAL INTERFACE CARD

The Serial Interface Card allows your APPLE II to exchange data with a remote computer or other high-speed device as easily as it talks to its own keyboard and display. You simply specify the area of memory whose contents are to be moved and the direction of movement (in or out). The rest of the job is handled by built-in firmware on the Serial Card.

A simple BASIC command (such as PR#1) initializes the Serial Card. A second command may then be used to specify any changes in speed, parity, etc., from the switch-selected preset conditions. Then, in the block transfer mode, a single statement will cause an entire data block to be transferred in or out of the APPLE II.

In the printer mode, information is automatically transmitted out through the card. Special provision is made for handling lower-case characters, carriage return delays, and printer line widths of up to 255 characters. BASIC listings are formatted.

INTERFACING HIGH-SPEED SERIAL DEVICES TO YOUR APPLE II

The Serial Interface Card can adapt a variety of serial equipment to your APPLE II. Hardware that is compatible with this interface includes modems (telephone line adapters), printers, plotters, computers, and other equipment that can:

- Transfer Serial Data at 75-19, 200 Baud, Half-Duplex
- Connector to an RS-232C Interface (which defines voltage levels and the connector type)

Complete operating information, logic diagrams and firmware listings are supplied in the Serial Interface Card Manual.

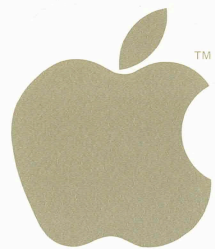
SPECIFICATIONS

PARAMETER	DESCRIPTION
Signal Level:	EIA RS-232C
Data Word Format:	1 start bit, 1 or 2 stop bits, 5-8 data bits; odd, even, or no parity; Checksum is optional.
Character Handling Options:	Lower-case characters can be optionally converted to upper-case or can be passed through unmodified and displayed in inverse video on the monitor screen.
Firmware:	768 bytes of PROM, included on card
Card Size:	4.5 x 2.75 inches (not including connector fingers); fits entirely inside the APPLE II case
External Connector:	DB-25 female connector with mounting bracket

ORDERING INFORMATION

Order Number: A2B0005. Supplied with:

- High-Speed Serial Interface Card
- Firmware in ROM
- Connector and Mounting Bracket
- Manual



APPLE INTELLIGENT SUBSYSTEMS

DISK II FLOPPY DISK SUBSYSTEM

GENERAL DESCRIPTION

Many computer applications depend upon rapid access to information. The home computer balancing a checkbook and the business computer managing inventory share this need. To provide for fast, low-cost data retrieval, Apple Computer, Inc. has developed Disk II.

Disk II simplifies the approach to your program library. No longer must you search through stacks of cassettes, or slowly read yards of tape to find the program you want. Now with a few keystrokes, your system will find and load any file by name. And it will do it quickly and reliably.

Disk II gives your system immediate access to large bodies of data. That makes inventory, address file, and recipe programs suddenly feasible. It means you can store a year's worth of financial records in one place, and sort through them quickly. And it allows you to handle many other applications that just were not practical before.

The Disk II Floppy Disk Subsystem consists of an intelligent interface card, a powerful Disk Operating System (DOS), and one or two mini-floppy drives. (The computer will handle up to seven interface cards and fourteen drives, for control of nearly 1.6 megabytes of data). The combination of ROM-based bootstrap loader and an operating system in RAM provides complete disk handling capability.

FEATURES

- Powerful Disk Operating Software:
 - LOAD and STORE files by name (Up to 35 Char/Name)
 - BASIC Program Chaining
 - Random or Sequential File Access
- Fast Access Time — 600msec (Max.) Across 35 Tracks
- Individual File Write-Protection
- Full Disk Capability in Systems with as Little as 16K RAM
- Data Transfer Rate of 156K Bits/sec
- Storage Capacity of 116 Kilobytes/Diskette
- High-Efficiency Subsystem Powered Directly from the APPLE II (Up to 14 Drives)
- Completely Assembled and Tested — Not a Kit
- Packaged in Heavy-Duty, Color-Coordinated Steel Cabinet



USING THE DISK II FLOPPY DISK SUBSYSTEM

The Disk II Subsystem allows your Apple to manipulate program and data files through simple BASIC statements. Command interpretation and file handling are controlled by software automatically loaded into RAM as the disk is initialized.

A BASIC statement such as PR#7 activates the Disk Subsystem. The CATALOG statement will then display a list of the files contained on a particular diskette. Other commands allow the user to Write-Protect a file, READ or WRITE it, and SAVE it back on the disk.

As data is stored on the subsystem, it is automatically put into unused sectors of the disk, which are linked together until a space of adequate size has been created to hold the new file. Thus the user gets the most efficient utilization of his disk area, yet does not have to know the maximum size of each file in advance.

Files stored on the disk can be copied, deleted, or renamed under program control. Volume numbers assigned to individual files or to diskettes allow the handling of successive files of the same name. And the CHAIN command permits the chaining together of multiple BASIC programs.

The Disk II Operating System fully supports both ROM Applesoft and Apple Integer BASIC through its universal command handler. All commands are completely explained in the manual supplied with Disk II.

SPECIFICATIONS

PARAMETER	DESCRIPTION
Commands:	OPEN, CLOSE, READ, WRITE, LOAD, SAVE, EXEC, RUN, APPEND, LOCK, CHAIN, UNLOCK, DELETE, MONITOR, NOMONITOR, MAXFILES, IN#, PR#, INIT, BLOAD, BSAVE
Access Method:	Random or Sequential — arbitrary record length
Bootstrap Loader Method:	By means of Loader routine in two 256 x 8 PROMs, on-card
Disk Drive:	Shugart 5-1/4" floppy disk.
Track Access Time:	Varies with number of tracks crossed. 200msec (avg.), 600msec (max. accross 35 tracks)
Disk Speed and Latency:	300 rpm, 100 msec avg. latency
Disk Capacity:	116K bytes (formatted), soft-sectored
Data Transfer Rate:	156K bits per second
Physical Dimensions:	Card — 4.5" x 2.75" (not including connector fingers): fits inside the APPLE II Drive — 6.1" x 8.75" x 3.8" (WDH)
Controller Capacity:	Up to two drives per controller. Multiple controllers can be used

ORDERING INFORMATION

Order Number: A2M0004. Supplied with:

- Floppy Disk Interface Card
- Bootstrap in ROM
- Disk Drive and Connecting Cable
- System Software on Diskette
- Manual
- Blank Diskette

Order Number: A2M0003. Supplied with:

- Second Disk Drive and Connecting Cable



APPLE DOCUMENTATION & ACCESSORIES

SYSTEM DOCUMENTATION

APPLE II BASIC PROGRAMMING MANUAL

All Apple computers come with complete documentation for users at every level of technical expertise.

This manual starts from the beginning with how to plug in the Apple. It then guides the user's first programming efforts. A humorous style and abundant examples make this the ideal textbook for newcomers to personal computing.

(Order No. A2L0005, 125 pages. Supplied with Apple systems)

APPLE II REFERENCE MANUAL

This manual addresses the details of the system: hardware schematics, firmware listings, special system features, and use of the monitor. It is aimed at the user who is comfortable with BASIC and wishes to become familiar with the advanced features of the APPLE II.

(Order No. A2L0001, 151 pages. Supplied with Apple systems)

APPLESOFT REFERENCE MANUAL

This manual introduces Applesoft: an extended BASIC language for business and scientific applications. It is written for the user who has some familiarity with the BASIC language.

(Order No. A2L0004, 75 pages. Supplied with systems using 16K or more RAM)

6500 μ P HARDWARE MANUAL

This manual is directed at the hardware designer who wants detailed information about the 6502 microprocessor used in the APPLE II. (Order No. A2L0002, 165 pages)

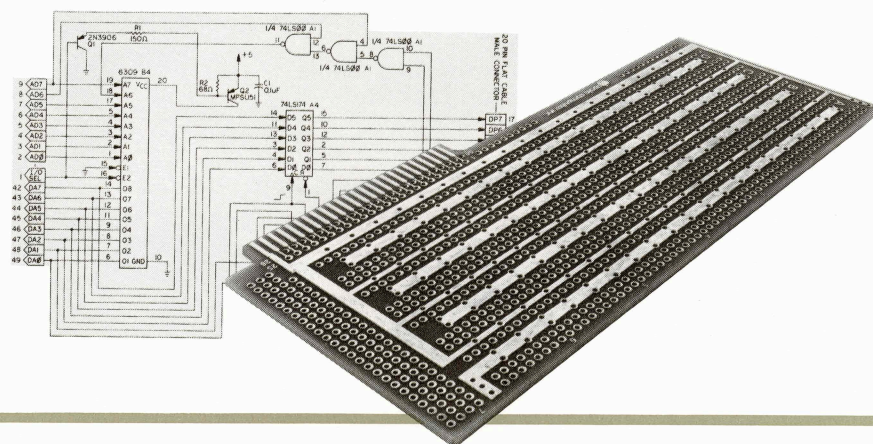
6500 μ P PROGRAMMING MANUAL

This manual addresses the internal structure and assembly language programming of the 6502 microprocessor. It assumes that the reader is moderately familiar with computer concepts. (Order No. A20003, 239 pages)

ACCESSORIES

HOBBY/ PROTOTYPING CARD

The Hobby/Prototyping Card provides the user with a means of building up experimental circuitry for the Apple computer. This 2 3/4" x 7", double-sided circuit board includes a hole pattern (on 100-mil centers) that accepts all conventional integrated circuits and passive components. The card plugs directly into one of eight sockets on the Apple circuit board, and fits entirely within the APPLE II case. Documentation includes a complete system bus description to aid the interface designer. (Order No. A2B0001.)



APPLE SOFTWARE BANK

SYSTEM SOFTWARE OPTIONS

APPLESOFT II FLOATING- POINT BASIC LANGUAGE

Applesoft II is an expanded version of Microsoft's popular floating-point BASIC. Its 9-digit arithmetic and large function library make it ideal for business and scientific programs. New features like high-resolution graphics routines, cassette data STORE/RECALL, and user-programmable error messages make the language both powerful and easy to use. Capabilities include:

- 3 Data Types — Real, Integer, and String
- Data Display in either Fixed-Point or Scientific Notation
- N-Dimensional Arrays and N-Letter Variable Names (first two letters significant)
- Extensive Mathematical, Logical and Scientific Capabilities
 - EXP, LN, SQ. RT., SIN, COS, TAN, ARCTAN
 - AND, OR, NOT, ABS, INT, RANDOM, SIGN
- String Operations to Aid the Business Programmer:
 - Compare: =, >, <, >=, <=, >>
 - Concatenate: +
 - Variable Type Conversion: ASC, STR, VAL
 - Substring Separation: LEFT, RIGHT, MID, LEN
- Graphics Statements that Simplify Display Programming:
 - Print Format Control: NORMAL, INVERSE, FLASH
 - Graphics Control: COLOR, PLOT, POSN, LINE, DRAW, SCRN, GRAPHICS, TEXT, HIRES, ROT, SCALE, SHAPELOAD
- General Operations that Include and Extend Upon Dartmouth BASIC:
 - Program Manipulation: CLEAR, NEW LIST, RUN, CONT, LOAD, SAVE
 - Variable and Function Definition: DATA, DEF. FUNCT, DIM
 - Data Handling and Storage: READ, RESTORE, STORE, RECALL
 - Loops and Branching: FOR...NEXT, IF...GOTO, IF...THEN, ON...GOTO, ON...GOSUB, ONERRGOTO, RESUME, GOTO, GOSUB, RETURN
 - Input/Output and Format Control: INPUT, PRINT, IN#, PR#, VTAB, TAB, HOME, PADDLE
 - Machine Level Statements: PEEK, POKE, CALL, POP, LOMEM, HIMEM

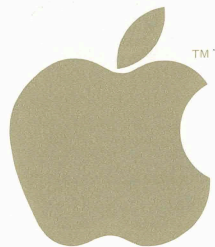
Applesoft II is supplied as a cassette tape or a plug-in ROM card. The tape version runs in systems with 16K or more of RAM (24K or more for high-resolution graphics). The ROM version will run in 4K or more of RAM, but requires 16K RAM if high-resolution graphics are used. A comprehensive reference manual is included. (Order Numbers: A2B0009 — card, A2T0004 — tape)

PROGRAM- MER'S AID #1

Programmer's Aid #1 is a ROM-based library of routines to simplify and enhance your programs. It's capabilities include:

- High-Resolution Graphics Generation
- Program Renumbering and Linking
- Tape Verification
- Musical Tone Generation (12 timbres and 5 octaves)
- RAM Testing
- Machine Language Program Relocation

Programmer's Aid #1 is packaged as a single 2K-byte ROM to be inserted in socket D0 of the APPLE II. The routines upon which it is based are completely documented in the manual which accompanies the package. (Order No. A2M0019)



APPLE INTELLIGENT SUBSYSTEMS

INPUT/OUTPUT DEVICES

For the user's convenience, Apple Computer has assembled a family of compatible products that enhance the usefulness of the APPLE II.

PRINTER II (Centronics MICROPRINTER-PI)

This compact, desk-top printer employs electric discharge technology to print up to 80 characters per line at 150 lines per minute. The printer produces 5 x 7 dot-matrix characters at 5, 10, or 20 characters per inch. It prints the full 96-character ASCII set, including lower-case letters. It is quiet and reliable, and uses no toner or ribbon. It prints on 4.75", aluminum-coated roll stock. The printer is supplied with a Parallel Printer Interface Card, all necessary cables and connectors, and operating documentation. (Order No. A2M0010)

PRINTER IIA (Centronics 779)

The 779 is a medium-speed impact printer for home and business applications requiring low-cost, multi-copy printing. It prints 132 (5 x 7) dot-matrix characters per line, at 60 characters per second. This printer is capable of reproducing the 64-character, upper-case ASCII set; and its tractor paper feed allows printing of five-part forms in widths to 9.8". The mechanism is packaged in a low-profile, desk-top cabinet. Printer IIA is supplied with a Parallel Printer Interface Card, all necessary cables and connectors, and operating documentation. (Order No. A2M0011)

MONITOR II

This 9-inch (diagonal) video monitor is the ideal display for the APPLE II when color output is not required. It sits neatly on top of the computer, and provides a very clean and sharp picture. It accepts direct video input from the system, so no modulator is required. Monitor II comes complete with all necessary cables, connectors, and documentation. (Order No. A2M0005)

SPEECHLAB™ VOICE RECOG- NITION UNIT (Heuristics 20A)

This plug-in module allows the APPLE II to recognize a spoken vocabulary of up to 32 user-selected words. The computer can be programmed to perform any task desired upon recognition of a key word. This product is well-suited to both entertainment and serious research uses; and has great potential in applications for the physically handicapped. The Voice Recognition Unit comes as a plug-in card, with a microphone and complete documentation. (Order No. A2M0015)

AC LINE CONTROL UNIT (Mountain Hard- ware Introl™)

This product allows the APPLE II to remotely switch any AC device ON or OFF. It operates by sending control signals through a building's AC power lines to up to 64 adapters located at outlets throughout the structure. Each remote adapter will switch and sense the status of two independent, 500-watt outlets. Installation is entirely by means of plug-in modules, so no re-wiring is required. Complete isolation from the AC line means there is no danger of shock or short-circuit. The master controller (which plugs into the APPLE II) and the remote adapters are sold separately, with full documentation. (Master Controller — Order No. A2M0012) (Dual Channel Remote Adapter — Order No. A2M0013)

TAPE RECORDER

A tape recorder is the basic program and data storage mechanism for the APPLE II. This one offers the convenience of pushbutton operation; and it runs from either batteries or the AC line. (Order No. A2M0017)

MODEM IIA

Modem IIA is an acoustic coupler which links the APPLE II (through the Communications Interface Card) to the telephone network. The modem is a 103A-type asynchronous device, suitable for data communication at 110 or 300 baud (10 or 30 char/sec). It operates in either the Originate or Answer modes. Connection to the phone system is accomplished by placing the telephone handset in position on top of the modem. No permanent connection or wiring changes are required.

Modem IIA is supplied with a Communications Interface Card, demonstration tape, all required cables, and complete documentation. (Order No. A2M0018)

Product specifications are subject to change without notice.